Expanding Universe: Excel Instructions

1) Create a Velocity column:

Click in cell F1. Type, "Velocity (km/s)" and then hit return.

Assume $z \approx \frac{v}{c}$, so $v = cz$.

In cell F2 type, "=300000*C2" and hit return.

Select cells F2 through F19 by clicking and dragging over them.

Under the *Edit* menu, choose *Fill Down*.

Column F should now contain the velocities of these galaxies in km/s.

2) Create a Distance column:

Click in cell E1. Type, "Distance (Mpc)" and then hit return.

Rearrange the equation: $m = M + 5\log\left(\frac{d}{10}\right)$ to solve for "d". Show your work below:

Your equation gives "d" in parsecs (pc). Divide it by the appropriate factor to get it into megaparsecs (Mpc).

In cell E2 type, "=" followed by your formula for the distance. But, instead of typing "m", type "B2" and instead of "M" type "-19.3". Then hit return.

Select cells E2 through E19.

Under the *Edit* menu, choose *Fill Down*.

Column E should now contain the distances to these galaxies in Mpc.

3) Make a graph of Velocity vs. Distance:

Select cells E1 through F19.

Under the *Insert* menu, choose *Chart*.

For the *chart type*, choose *XY (Scatter)*. Click *Next*.

This window displays a sample plot. Click *Next*.

This window has several tabs allowing you to format how the graph will appear. You may wish to label the axes at this time. Click *Next*.

Place chart "*as object in*" and click *Finish*.

The graph should appear in your spreadsheet window.

While the graph is still selected, go to the *Chart* menu and choose *Add Trendline*. Under the *Type* tab, choose *Linear*. Under the *Options* tab, check *Display equation on chart*. Clock *OK*.

A regression line and equation should appear on the graph.